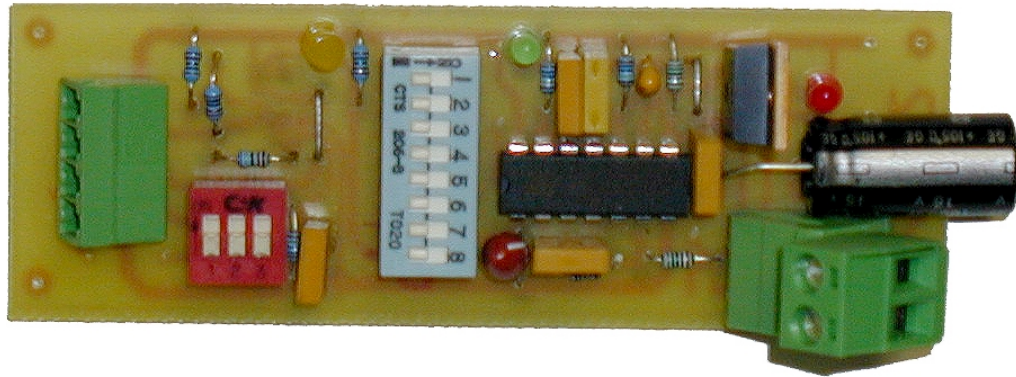


The Mission Command Timer 2



Timer2
User Manual
Rev. 1.00
June 2001

Table of Contents

Section 1 Introduction

Section 2 MCT2 Features

Section 3 Power Requirements

Section 4 Connections

Section 5 Programming the time delay

Section 6 Normally open or closed switch

Section 7 LED indicators

Warning

Power must only be applied to the timer BEFORE connecting the output to a flashbulb or electric match. If the output connector is to remain plugged into the timer, use a switch to break the connection to the flashbulb or electric match before power is applied. Switching only the power supply with an output connected will result in the activation of the flashbulb or electric match.

Section 1 Introduction

The Mission Command Timer 2 is the answer to a low cost, small timer that can be used for recovery or staging. It uses an eight position DIP switch that programs the unit for a time delay of $\frac{3}{4}$ to 60 seconds in 0.3 second increments. A two pin high reliability connector is provided for output to a flash bulb or electric match. A four pin connector is provided for 9V battery input and acceleration switch input.

Section 2 MCT2 Features

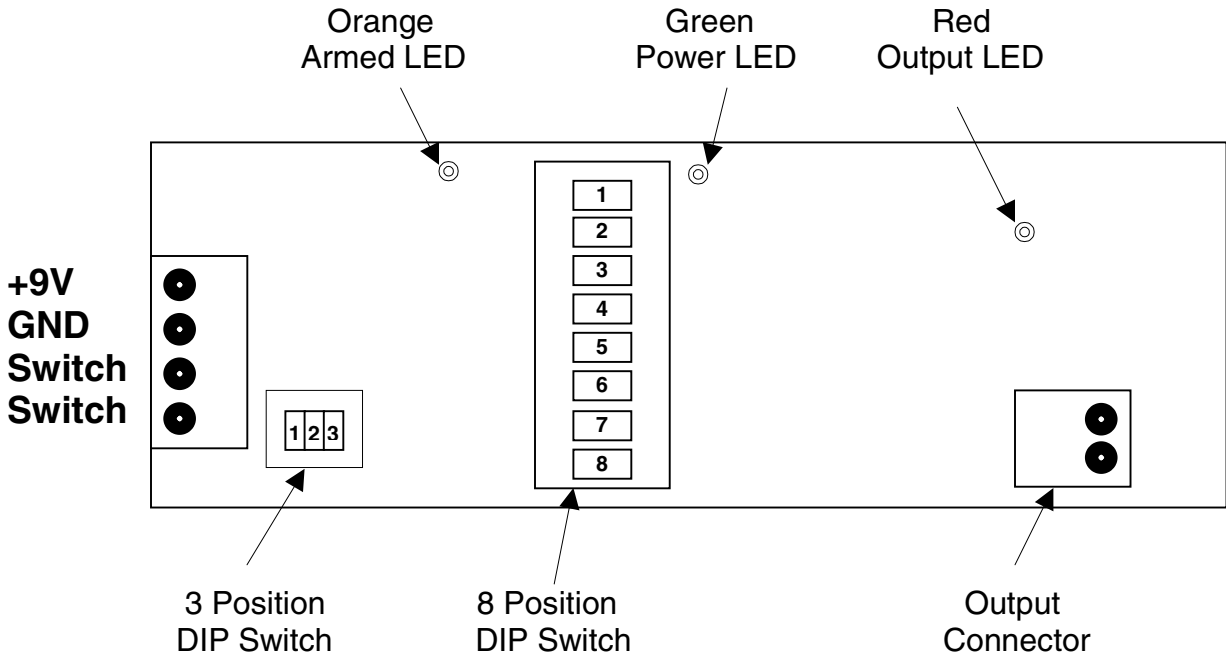
- Low cost
- High reliability
- Small size (1 $\frac{1}{4}$ " x 3 $\frac{3}{4}$ ")
- Programmable from $\frac{3}{4}$ to 60 seconds
- Resolution of 1/3 second
- User selectable for Normally Open or Normally Closed switch input
- Switch debounce (switch must be made for $\frac{1}{2}$ second before the timer begins timing)
- LED indicators for power, armed and output

Section 3 Power Requirements

- 9V @ 0.1A

Section 4 Connections

The following diagram shows the location of the DIP switches, connectors and connector points on the MCT2.



The four pin connector at the left of the board is used to connect a 9 Volt battery and to connect the arming switch to the board. The two pin connector at the right of the board is used to connect a flashbulb or electric match to the output.

Section 5 Programming the time delay

The timer begins timing after the switch inputs have been closed or opened for $\frac{3}{4}$ seconds. This prevents accidental arming of the system due to vibration or shock. Either a normally open or normally closed switch can be used. The 3 position DIP switch is set to the type of switch to be used.

The time delay is set using the 8 position DIP switch. When the switch is in the **Off** position the amount of time corresponding to that switch will be added to the time delay according to the following table.

	Switch Number							
time	1	2	3	4	5	6	7	8
0.3	x							
0.6		x						
1.1			x					
2.3				x				
4.7					x			
9.3						x		
18.7							x	
37.3								x

For example to set a delay of 8.6 seconds from launch the following calculation would be made:

$$0.75s + 4.7s + 2.3s + 0.6s + 0.3s = 8.65 \text{ seconds}$$

arm time #5 #4 #2 #1

Therefore the switch positions would be:

- #1 = Off
- #2 = Off
- #3 = On
- #4 = Off
- #5 = Off
- #6 = On
- #7 = On
- #8 = On

This results in a close value to the desired time delay. Always verify the time delay using a stopwatch and the output LED.

Section 6 Normally Open or Closed Switch

The timer can be configured for input from either a normally open or normally closed switch. A normally open switch will be open before launch and close after launch. An example might be a lever switch with a weight on the lever that will close upon upward acceleration.

A normally closed switch will be closed before launch and open after launch. An example might be a wire that is secured under the nozzle of the rocket motor and is burned open upon ignition.

The three position switch must be set to the type of switch to be used.

Normally Open

S1 = Off

S2 = Off

S3 = On

Normally Closed

S1 = On

S2 = On

S3 = Off

Section 7 LED Indicators

There are three LED indicators on the timer.

Green – Power is on to the board.

Orange – The switch input has been made for at least $\frac{3}{4}$ seconds and the timer is armed and timing.

Red – The time delay has been reached and the output is on. This output will flash for about 1 second when reaching the desired time.

Warning

Power must only be applied to the timer BEFORE connecting the output to a flashbulb or electric match. If the output connector is to remain plugged into the timer, use a switch to break the connection to the flashbulb or electric match before power is applied. Switching only the power supply with an output connected will result in the activation of the flashbulb or electric match.